VEHICLE MAINTENANCE AND AIR QUALITY

EPA –Regulated Pollutants of Concern in South Carolina

- **Ground level ozone** can aggravate or cause respiratory problems. Vehicles contribute to the ground level ozone problem by emitting **oxides of nitrogen (NOx)**, which combine with **volatile organic compounds (VOCs)** in the air in the presence of sunlight to form ozone. The **ozone layer** is 10-30 miles above the earth and not related to ground level ozone. While ground level ozone is unhealthy, the ozone layer is protective - ozone is **"good up high, bad nearby."**

- **Particulate matter (PM)** consists of solid or liquid particles found in the air. Exposure can irritate or damage the lungs. Vehicle exhaust, tire particles and unpaved roads contribute to particulate matter. Substances in vehicle exhaust, including NOx, VOCs, sulfur oxides and ammonia, react in the atmosphere to form PM as well.

Ground level ozone and PM emissions are primarily addressed through your vehicle's **emission control system.** The system reduces the NOx and VOCs that contribute to the formation of particulate and ozone. Components of the emission control system also enhance fuel efficiency.

Components of emission control systems:

The emissions control system reduces air pollution. On-board diagnostic monitoring (OBD) of the emissions is a control system operated by a computer. The computer sends a message to the driver via the "Check Engine" or malfunction indicator light (MIL) when the computer detects a malfunction. There are circumstances under which a vehicle's OBD system will automatically shut off a "check engine" light if the problem is not detected again. When the light is on but not flashing, it indicates that a problem has been detected and the vehicle should be serviced as soon as possible. Responding to the light promptly can reduce vehicle emissions and help to improve air quality. A flashing light indicates a severe malfunction and is intended to discourage vehicle operation.

Catalytic Converter - oxidizes VOCs and carbon monoxide (CO) and reduces NOx.

Oxygen Sensor – assures that the mix of fuel and oxygen is optimal. If the ratio is just right, fuel can be burned in the engine with maximum efficiency. If there is too much oxygen, VOC and NOx emissions increase. If there is too much fuel relative to oxygen, CO emissions will increase. Fuel economy can be compromised when the air sensor is not functioning properly. In fact, replacing a degraded oxygen sensor with a new one may increase fuel efficiency by 10 percent to 15 percent.

Exhaust Gas Recirculation (EGR) – a portion of the exhaust gas is returned to the combustion chamber, reducing combustion temperature and lowering emissions of NOx. Fuel economy can be enhanced by EGR.

Air Injection - air is pumped into the exhaust manifold to help fuel burn more completely, oxidizing VOCs and CO.

Positive Crankcase Ventilation –crankcase ventilation vapors are redirected into the intake manifold, reducing VOC emissions. Ventilation helps prevents engine corrosion, oil dilution and engine deposits.

Misfire monitor – causes the "check engine" light to illuminate when the engine misfires. During a misfire, the unburned fuel and air mixture is pumped into the catalyst. The next blast of hot gas then ignites the mixture, driving up the catalyst temperature by as much as 1400ºF and causing a marked deterioration in the catalyst, so that severe catalyst damage can occur very quickly.

Maintenance to Maximize Fuel Efficiency and Reduce Greenhouse Gas Emissions:

Greenhouse gas emissions contribute to **global warming** or climate change. While some greenhouse gases occur naturally in the atmosphere, others result from human activities. Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, and ozone. Energy-related c**arbon dioxide** (CO_2) emissions, such as those resulting from burning fuel, represent 82 percent of U.S. greenhouse gas emissions. CO_2 emissions are always linked to fuel consumption because CO_2 is the ultimate end product of burning gasoline. The more fuel a car burns, the more CO_2 it emits. Conversely, efficient vehicles that burn less fuel emit less greenhouse gas.

Air Filter: Replacing clogged air filters improves gas mileage by as much as 10 percent and protects the engine.

Motor Oil: Using the recommended grade of oil maintains better fuel economy. Using different motor oil than the grade recommended for a particular vehicle can lower gas mileage by 1 to 2 percent.

Tires: Properly inflated and aligned tires can improve gas mileage by around 3.3 percent

Tune-ups: A tune-up can improve fuel economy by 4 to 12 percent. Regular engine tune-ups and car maintenance checks help avoid fuel economy problems due to worn spark plugs, dragging brakes, low transmission fluid, or transmission problems. When average gas mileage falls by 10 to 15 percent, a tune up is needed. Check your owners' manuals for tune-up recommendations.

Driving habits can affect fuel efficiency and greenhouse gas emissions. It is not necessary to expend fuel warming up the engine before driving, even in the winter. Accelerating smoothly, removing extra weight and driving the speed limit can help. At speeds over 60 mph, greenhouse gas emissions progressively increase and fuel economy drops significantly.

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